The Role of Design History in the Museology of Computing Technology

ATKINSON, Paul <http://orcid.org/0000-0002-6633-7242>

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The Role of Design History in the Museology of Computing Technology

Paul Atkinson
Sheffield Hallam University

Museology / Electronic computers / Narrative frameworks / Analytical perspectives

The role of design history in museums devoted to the history of technics and technology is surely to ensure that the narratives employed describe the wide range of drivers behind the development of technological artefacts in an unbiased way, and ideally, to communicate as accurately as possible the different ways in which technology has been presented to and received by the public. Using the example of the electronic computer, this paper aims to demonstrate the problematic breadth of the different narrative themes necessary to achieve such communication.

This paper concentrates on three of the most common types of narrative employed in museums of technology: the interrelated narratives of individual endeavour, national agendas, and corporate competition. Following these 'traditional' narratives is a description and examples of a wider, contextual discourse in which technology has been presented in equal parts as heralding both a utopian and a dystopian future for mankind.

It is argued that in order to present a thorough and meaningful history of technological objects, these different narratives need to be addressed in a balanced and nuanced way.

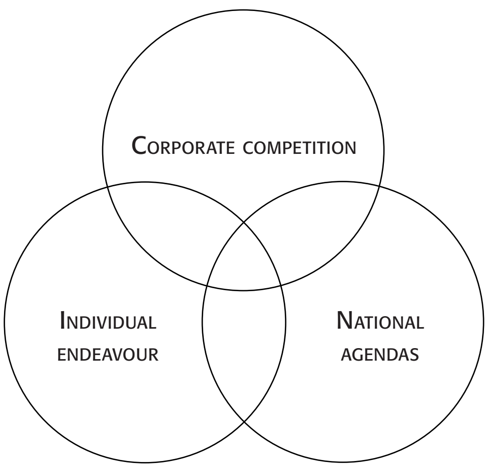

Fig. 1 The interrelated narrative themes of Individual Endeavour; Corporate Competition and National Agendas.

Introduction

As academic research into the history of the electronic computer has grown and developed over recent years, the complexity of the object and the wide variety of factors that have effected its increasing dominance in our everyday lives have come under scrutiny. As a result, numerous 'histories' of the object have been constructed from a variety of perspectives, including technologically deterministic accounts of continual, unstoppable 'progress'; socio-economic accounts of corporate growth and decline; political accounts of world war and cold war subterfuge employing computers, and social constructionist texts arguing that computer developments have followed the public expectations fostered through mainstream futurism. While this spread of narrative lenses is most welcome in the world of academic literature, it presents a significant problem in the context of the museum, where the space and time to present complex narratives is limited.

Possibly because of this significant limitation, there is, perhaps, a tendency of computer museums to overstate the sometimes simplistic technologically deterministic aspects of computer development and underplay the more complex and nuanced economic, political and social construction aspects.

While the range of narratives applicable to the development of computing technology is wide, the most common types of narrative employed are the interrelated narratives of individual endeavour, national agendas and corporate competition (Figure 1). Significant overlap is inevitable, with many of the most interesting stories lying in the space between at least two of these narrative areas. There follows a few short examples of each of these narratives.

Narratives of Individual Endeavour—colourful characters

The history of the earliest days of computing is littered with colourful stories of lone inventors, toiling away in workshops, investing time and effort into attempts to solve seemingly intractable problems. It has to be said, though, that often these accounts concentrate on the failures rather than successes...

The earliest of these inventors, the English mathematician Charles Babbage, predates the electronic computer by some way. He started developing a mechanical calculator in 1821 at the behest of the British government who financed his work in the interest of national advantage. He worked determinedly for fifty years on designs for his 'Difference Engine' and its successor, the 'Analytical Engine', spending all of the money awarded to him constantly refining and redesigning the machine without producing a working version. Although he never completed its construction, his work was widely disseminated through lectures and inspired numerous others and his reputation as the father of the modern computer was assured when nearly 150 years after his design for the Difference Engine was completed, a fully working version was assembled from his plans (Atkinson, 2013).

As the computer industry grew, so did the number of colourful characters involved. Much later in the electronic computer's history, Sir Clive Sinclair used cutting-edge research to push technological boundaries, and offered products for sale by mail order before they existed. He then used the money from these sales to try to develop the products (not always successfully). He attracted numerous government grants, which he used to try and develop a miniature television, but after his first few versions flopped, the funding was withdrawn. He later launched numerous successful products including some of the earliest and best-selling low-cost home computers, the Sinclair ZX80, ZX81 and ZX Spectrum, and the groundbreaking but ultimately unsuccessful QL computer in 1984, before selling his computer business. Things went spectacularly awry with his widely ridiculed one-man, battery-driven vehicle, the Sinclair C5. His new company went from product launch into receivership in just seven months (Atkinson, 2013).

Perhaps to date the most famous individual associated with the computer industry is the late Steve Jobs. Famously teaming with the talented technologist Steve Wozniak, Steve Jobs was the visionary businessman who saw the potential of the personal computer revolution, changing the device from a piece of arcane technology into an 'information appliance'. An explosive character determined to get his own way no matter who he upset, he was finally ousted by his own executive board in 1985, only to return in 1997, when the company had completely lost its way and was facing a dire financial future. From there he built the company back up to the position it is in today, according to the various biographies, by sheer force of will. The personal battles between Steve Jobs and, in particular, Bill Gates, are well documented, and have now formed part of popular culture—the battles between the old, grey, outdated technology of Microsoft and the futuristic, modernist white world of Apple being lampooned even in popular children's films such as *Despicable Me*.

The personalities involved in these narratives, and the human aspect they bring to the often impersonal or anonymous side of technological development are clearly valuable assets in attracting an audience to visit museums of technology. The challenge here is to present the individuals and their often-entertaining activities in a way that inspires the audience without falling into out-dated Design Historical modes of hero worship or celebratory canonisation.

Narratives of National Agendas—attempts to build a computer industry. At the point in time (around the mid–late 1940s) when huge 'electronic brains' filled whole rooms, took teams of people years to build and weeks to program to perform calculations, the idea that they would eventually become personally-owned 'information appliances' was unthinkable. The huge costs involved in their development could only be made via significant government investment but the results were often eventually commercialized by private corporate concerns that used that investment to turn themselves into massively successful businesses.

Corroborating the well-known proverb that 'necessity is the mother of invention', the Second World War provided exactly the right impetus for the military to develop (more or less simultaneously) the valve-based code-breaking computer 'Colossus' in the UK and the artillery firing table calculator 'ENIAC' in the US. The UK kept their work on computers secret because of its application, whereas the US' breakthrough was publicly displayed and was front page news across the world. Consequently, the US had a head start in establishing a commercial computer. The ordnance department that had financed the ENIAC understandably wanted the technology for free, but the University of Pennsylvania where it had been developed claimed they had patent rights.

The inventors of ENIAC, University staff J. Presper Eckert and John Mauchly, challenged the University's position as they wanted to go into business to make commercial computers. The University backed down. Eckert and Mauchly raised the money to develop the military ENIAC machine into the commercial UNIVAC machine from the US government, which wanted a domestic computer industry, and the Census Bureau, which desperately required the counting ability of computers. First sold in 1951, the UNIVAC achieved television celebrity status when it correctly predicted the outcome of the Presidential Election in 1952 (although its original prediction was not believed and so not transmitted) (Atkinson, 2010).

Similar histories of government funding providing the technology for private business to make profit can be found across the world. Shortly following WWII, the government-owned National Physical Laboratory in the UK funded a computer development project and enlisted the help of Alan Turing (who had developed the code-breaking 'Bombe' that preceded the top-secret Colossus machine) to design it. Bureaucracy caused delays and Turing's plans for the Automatic Computing Engine were never realised. He went instead to Manchester University to work on the 'Manchester Baby', the first stored-program computer. With funding from Ferranti, this prototype became the Ferranti Mark I, the UK's first commercial computer in 1951 (Atkinson, 2010).

In a same vein, the Swedish government, keen to keep abreast of the burgeoning electronic industry after the War, had been planning to buy computers from America, and sent engineers to study there until it became clear that the Cold War was going to prevent the export of computers. Instead, the government set up a public institution to develop its own computers, and in 1950, produced an electro-mechanical machine called 'BARK', and by 1953 had used its knowledge of American computers to produce 'BESK', which at the time was the fastest computer in the world. Licences were granted to industry to manufacture copies of the BESK machine, and before long a number of Scandinavian companies including SAAB and Facit were producing their own variations (Atkinson, 2013).

Each of the examples outlined here obviously have a strong national bias. Understandably, different museums have handled their country's history in relation to the computer's development differently. The Computer History Museum in Mountain View, California[1] pays great heed to the development of ENIAC; The National Museum of Computing at Bletchley Park, Milton Keynes[2] stresses the development of the Colossus and the work of Alan Turing leading to the 'Manchester Baby', while the Datamuseet IT–ceum in Linköping, Sweden,[3] is proud to present its archive on the BESK machine. The problematic issue here is to legitimately place national achievement and the political situation that fostered them within a broader context of international parallel developments.

Narratives of Corporate Competition—the rise and fall of IBM. Given their prominence as one of, if not the most successful company in the world, it would be understandable to think Apple owned the greatest market share of computers ever. In fact, in 2016, Apple's share of the global PC market was estimated to be 7.4% (Fingas, 2016). Compare this with the fact that in the mid 1950s, IBM had produced 70% (yes, 70%) of all computers that had ever been made in the world (Pugh and Aspray, 1996: 15). That gives you some idea of the dominance IBM held in the industry. Building on earlier success in producing mechanical tabulating machinery used for keeping business records, the company expanded rapidly when it embraced emerging computer technology after World War II. It was so successful at this that before long the computer industry consisted of the giant that was IBM, and a few, much smaller companies. This situation was often referred to in computer industry media as 'IBM and the seven dwarves', the seven dwarves being Burroughs, UNIVAC, NCR, Control Data Corporation, Honeywell, General Electric and RCA (clearly a very US-led narrative). The history of the electronic computer throughout the 1960s and 1970s is consequently more often than not presented as a case of IBM leading the way globally, with competition struggling to make inroads into their dominance at various points through means of technological innovation.

The story of how IBM fell from this position provides an abject lesson to all companies on the dangers of complacency. Convinced that there was no market for home computers, the management continually rebuffed the proposals to develop small personal computers from their own research and development teams. When in 1977 three game-changing products appeared on the market in the form of the Commodore PET 2001, the Tandy TRS–80 and the Apple II, the market for home computers expanded exponentially and IBM were left with no product to compete. An attempt was made to develop a very advanced personal computer called 'Aquarius' that had a number of revolutionary features including a prototype solid-state memory and solid-state cartridges of dedicated software packages, but management considered the new technologies involved too risky and the project was shelved.

By this time, the only way to get a product to market quickly enough was to circumvent the company's usual lengthy product development route and create a design that used mainly third party components and software developed by outside suppliers. This meant that when it was launched, the IBM PC was a very easy design for competitors to copy and make their own 'clones', which they did in their millions. The only part that couldn't be copied was the operating system, and that was sold only by Microsoft. IBM never recovered from the impact of that decision (Atkinson, 2013).

In a similar vein to the narratives of national agendas, there is the problem here of presenting a balanced overview. It is only to be expected that corporate museums and archives such as those at the Sony and Fujitsu headquarters in Tokyo, or the Philips Museum in Eindhoven, will almost without exception deal only with the company's own products (often presented in isolation, with little if any reference to a wider context). Independent museums, however, sometimes concentrate on the histories of national corporations at the expense of documenting international competition.

Back to the Future

Outside of these three interrelated narratives lies arguably the most important narrative of all: that of the reception of computing technology by the general public. It is perhaps the most difficult narrative of all to present, but it is important in that it provides valuable insight into the public perception and reception of computers. The future hopes and fears of society are implicitly reflected in the design of every generation of computer hardware and the promotional and instructional material that accompanied them. This is difficult to portray because such a narrative relies on a level of analysis and interpretation, but the ephemera that surrounds the physical object of the computer—the newspaper and magazine articles, television programmes, promotional films, instruction manuals and advertising brochures—paint a fascinating picture of the fluctuating perception of computers in the mind of the public. Analysis of this ephemera shows that the reception of computing technology can be framed within two contemporary binary opposites. Admiration and hope formed the basis of a Utopian discourse; while fear and pessimism formed the basis of a Dystopian discourse (Figure 2).

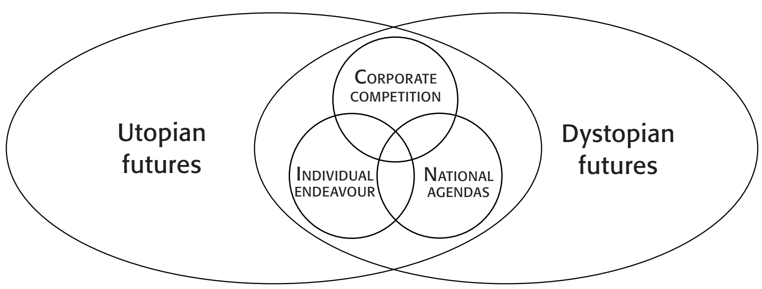

Fig. 2 'Traditional' narrative themes within the contexts of utopian and dystopian representation and consumption.

[1] See http://www.computerhistory.org/
[2] See http://www.tnmoc.org/
[3] See http://www.datamuseet.se/english/

Utopia

One phenomenon that accompanied the introduction of the electronic computer was a utopian vision of how it could potentially alter everyday life for the better. In the early 1930s the influential economist, John Maynard Keynes, believed that society would benefit from further developments in technology, and that our standard of life would improve at an ever-increasing rate. He predicted that within the space of one century, (i.e. by 2030) mankind would have solved 'the economic problem' he had been facing for all of his existence—the struggle for subsistence—and be confronted with an entirely new problem of how to occupy the increased leisure time technology would afford (Keynes, 1931). This became a prevalent idea. Popular culture from the 1950s onward was awash with ideas of a healthier, wealthier society enabled by computers. Technology was going to make life much more enjoyable by giving us an excess of free time. In the office, computers would do a week's paperwork in minutes. In the home, computers would control the living environment and take care of all the housework. By freeing users from the drudgery of everyday chores, we would have more time to spend with our families and friends and to enjoy life.

How computer technology would prove of benefit in the workplace was fairly straightforward to predict. For example, 'LEO', was the first electronic computer designed specifically for business applications. Its makers, J. Lyons & Co., were a household name in food retailing. The company financed the development of a computer at the University of Cambridge in 1949 and then adapted it to create the Lyons Electronic Office (LEO) Mark I, able to calculate the ingredients for the following night's production of goods, plan their delivery and handle invoicing, accounts and payroll functions. They saw the computer would radicalize many mundane clerical office tasks. Business would see massive increases in productivity and efficiency, allowing costs to be cut and profits to be maximised.

In the running of the home, where so many of the tasks performed everyday were routinely physical ones rather than administrative ones, the role and benefits of the computer were more difficult to pinpoint, yet it was also the arena in which computers promised to most directly affect our day-to-day existence. Many of these Utopian predictions centred on bringing the automation found in the factory into the domestic space. Fred McNabb's illustrations were examples of predictions for future homes that featured automated conveyor belt cookery, digitally controlled dishwashing and labour-free laundering. The gap between the automated factory and the labour-saving house was presented as being very small indeed.

Dystopia

Of course, alongside these wistful imaginings of a computer-aided life of leisure ran more fearful concerns about the impact of automation on our society. Popular media took every opportunity to point out potential pitfalls of future. Witness the Hanna–Barbera cartoon series *The Jetsons* of the early 1960s which showed push-button automatic meal makers producing the wrong food, sending a pizza flying across the room or producing uncooked frozen food before exploding.

Technical developments were evidently easier to predict than social ones. In the case of *The Jetsons*, it might have been possibly because social changes would be difficult to explain in a cartoon, or because the comic effect arises from putting the unusual (the new technology) in a familiar (the traditional social) setting. In *The Jetsons*, the nuclear family with a working husband and stay at home housewife was the norm, and there was never any blurring of the boundary between the workplace and the home responsible for so many extra working hours today. The lack of foresight regarding social change has been, though, a major flaw in futurism and one that has diminished its reputation significantly. As Samuel Lawrence observed, 'The bias towards predicting technological versus social progress has been and continues to be the Achilles' heel of futurism, the next wave of gadgets and gizmos easier to see coming than a cultural tsunami' (Samuel, 2009: 6).

Having said this, fears of social change have long been part of the representation of computing technology. Harrowing headlines accompanied articles about the first 'Mechanical Brains', declaring the end of civilization, and when 'Electronic Brains' started to appear commercially, one article warned that these machines gave one man the computing ability of 25,000 mathematicians. This kind of worrying statistic, pointing to the thousands of jobs that could potentially be made redundant, has been a recurring theme, and shows no signs of abating: witness the constant stream of stories in the media today around the potential forthcoming impact of Artificial Intelligence. The hopes of salvation embodied in futuristic technologies have always carried such a caveat with them—a fear that we may become the victims of the very technologies we create.

Conclusions

The complex, interwoven history of the electronic computer is clearly so expansive, and can be legitimately viewed from so many different perspectives, that any museum of technics and technology would find it impossible to cover every aspect. It is quite possible for a number of different narratives to be presented concurrently, but a holistic overview of these narratives would not be feasible. For this reason, inevitable bias appears. Firstly, museums' collections are bound to be dominated by local and national material that has been specifically sourced or donated. Secondly, obviously, each museum has to appeal to its audience which will inevitably be dominated by local/national people. While an American institution foregrounding the history of the American pioneers behind ENIAC, or a British institution celebrating the work of Alan Turing is not only understandable, but financially necessary; making the audience appreciate the global situation surrounding that history and the very real connections that existed between them is equally important. Similarly, portraying the history of national corporations is equally understandable (especially when, for example, IBM had the kind of dominance in the marketplace discussed), but outlining the international economic and political situations that afforded such dominance (as well as the events that led to such a swift demise) deserves far more exposure.

Explaining the presentation to and reception of computers by the general public presents a more difficult issue to resolve. That electronic computers are now such a dominant feature of our everyday life, so ubiquitous that they often disappear beneath our cognitive radars, trying to explain how they appeared to and were perceived by people when they were new, alien artefacts, runs the danger of being seen as a merely a source of amusement. For example, at one point, it was a commonly held view in the industry that the role the computer would perform would not extend beyond calculating mathematical functions, and so the applications would be of relevance only to scientific and business communities. The statements made about how much computing power would be required in the future seem laughably low today (measured in kilobytes, not terabytes), when even home computers regularly manipulate huge image files. When it later became apparent that the applications could in fact be much wider and used across different areas of business, computers were still horrendously complex and expensive pieces of equipment. It made logical sense, therefore, to have single centralised machines, with numerous people accessing them from geographically dispersed offices (universities being a good example). This was achieved via 'dumb' terminals that had no computing power of their own. When the idea of a computer in the home was first mooted, it was extrapolated that this operating model would be retained and that remote terminals would appear in a domestic setting. Without an understanding of these changes, presenting images of such domestic terminals could be interpreted as misguided or misjudged attempts to predict computer usage without appreciating how fast computers would develop (where in fact, it has been common knowledge since the early sixties exactly how fast computers would develop after the publication of Moore's Law, predicting that computers would double in power and halve in size every two years).

Design History as a discipline, then, has an important role to play in ensuring these widely different perspective lenses are used to analyse the complex and nuanced history of the computer, and that the focus of analysis considers not only the technological development of the object, but the wider social construction, representation and consumption of the computer within society.

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Paul Atkinson is an industrial designer, design historian and educator. He is Professor of Design and Design History at Sheffield Hallam University and author of two books on the design history of computers. He has also written about the future of the design profession and the impact of emerging technologies on the nature of design.
ORCID http://orcid.org/0000-0002-6633-7242
p.atkinson@shu.ac.uk